

METHOD AND APPARATUS FOR
TRACKING THE POSITION AND ORIENTATION OF A STYLUS
AND FOR DIGITIZING A 3-D OBJECT

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ABSTRACT OF THE DISCLOSURE

10 A method and apparatus for measuring three-dimensional (3-D) coordinates. A 3-D object
can be digitized into a mesh representation manipulable by a computer system by tracing a stylus
of a probe apparatus over surfaces of the object. The probe apparatus includes an arm having a
series of linkages and joints. The arm can be assembled by placing the joints of the arm in joint
fixtures a desired distance and angle apart and bonding the joints to a linkage. The probe apparatus
is calibrated by placing the tip of the stylus at an arbitrary point in a work volume and varying the
stylus' orientation to find error values and determine calibration parameters. The sensors of the
15 probe apparatus are zeroed by placing the probe apparatus in the only possible home position and
assigning assumed starting angles to the sensors. A rotary table can be used to support the object
being digitized, where the rotation of the rotary table and object during digitization is sensed and
included in coordinate calculations. A mesh representation of the object is developed by a
computer system by incrementally creating and displaying triangles from data points of contour
20 lines of the mesh. A selection template allows commands to be selected by the stylus by defining
a template having selection areas within the probe's work volume and associating the selection
areas with specific commands to the host computer.